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(54) IMPROVEMENTS IN OR RELATING TO CONTAINERS

(71) We, ALCAN FOLIEN GmbH, a Company organized under the laws of the Federal Republic of Germany, of Wiesenstrasse 24-30, 5880 Ludenscheid, Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particualrly described in and by the following statement:-

The invention relates to containers and more particularly to containers made from metal/plastics composite materials.

Such packaging containers are known. They are often used for packaging foods. Since these known containers consist of a composite material comprising only two layers, they are very simple and inexpensive in construction. However, they suffer from the disadvantage that they cannot be satisfactorily produced by drawing, since their deformability both in conventional drawing on a drawbench and in deep-drawing is inadequate, particularly if the metal layer is relatively thin.

To enable containers consisting of a metal/plastics composite material to be satisfactorily produced by a drawing method, they have also been made from three-ply composite materials comprising a middle layer of very thin aluminium and two outer layers of plastics film, one of which is biaxially oriented. The rigidity of these known containers is provided by the plastics films, the total thickness of which is greater than that of the extremely thin layer of aluminium which is present only for the purpose of providing a seal against gas and water-vapour. These containers are generally produced by the conventional drawbench method, in which the required stretching of the thin aluminium layer is rendered possible by the biaxially oriented plastics film.

Moreover, tablet containers produced on conventional drawbenches are also known wherein a relatively thin biaxially oriented plastics film is applied to the outer surface of the aluminum layer. The surface of the aluminium layer presented to the interior of the container is provided with a heat-sealing varnish which is intended to form a seal with an aluminum foil cover for the container. Here too the stretching of the aluminium layer is considerably improved by the biaxially oriented plastics film. However, the aluminium layer of these tablet containers is not satisfactorily protected against corrosion by the heat-sealing varnish on that surface of the aluminium layer presented to the interior of the container, since this layer of varnish becomes porous during drawing on the conventional drawbench.

According to the present invention there is provided a drawn container made from a metal/plastics composite material composed of a metal layer lined with a plastics film only on its surface presented to the interior of the container, the metal layer having a thickness in the range 0.04 to 0.30 mm, and the plastics film being biaxially oriented and having a thickness in the range 0.008 to 0.025 mm.

The metal layer largely imparts the required rigidity to the container, whilst the plastics film affords good protection against corrosion to the metal layer.

The presence of the biaxially oriented plastics film only on that surface of the aluminium layer that is presented to the interior of the container and the load-elongation behaviour of this plastics film has been found to produce greater deformability to a surprising extent during deep-drawing of the container even when the thickness of the metal layer is near the lower limit, for example 0.05 mm. For a given diameter, greater pass-reductions in deep-drawing can be achieved than in the known containers. Inverted passes and double passes are possible, so that a greater production capacity and containers with greater pass-reductions in deep-drawing can be obtained.

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In a preferred form of the container in accordance with the invention, the metal layer consists of 98 to 99.6% pure aluminium or of an aluminium alloy. Advantageously, the aluminium layer has a thickness of 0.05 to 0.20 mm, and the plastics film has a thickness of 0.012 to 0.02 mm. Advantage also accrues if the plastics film is made from a polyethylene terephthalate (PETP), polyamide or polypropylene. Polyethylene terephthalate provides the aluminium with particularly good protection against corrosion. This is advantageous when containers in accordance with the invention are used for the packaging of chemically active foods such as for example, tomato juice, mustard, horseradish, mayonnaise, anchovy paste, processed cheese and fruit juices.

A particularly simple and inexpensive arrangement is obtained if the biaxially oriented plastics film, applied to that surface of the metal layer that is presented to the interior of the container, is made of PVC or of a copolymer of vinyl chloride with an optional addition of a plasticizer. In a preferred form, this PVC film may have a thickness of 0.015 to 0.020 mm. Whereas the biaxial orientation of plastics films made of polyethylene terephthalate (PETP), polyamide or polypropylene is achieved by a separate stretching operation, in the case of PVC film even a smaller degree of biaxial orientation, as achieved during production of the film on a blow extruder, sufficies. In this method of production of the film on a blow extruder, suffices. In this method of production, a flexible PVC tube is first formed with the aid of an annular die, and immediately after the tube emerges from the die it is inflated with compressed air so that its diameter becomes considerably greater than that of the annular die. Thereafter, the inflated PVC tube is flattened between a pair of rolls to form a thin film, the PVC material being stretched int he longitudinal direction by causing the rolls to turn at a greater speed than that at which the tube emerges from the die. The longitudinal orientation thus achieved, together with the transverse orientation caused by inflating the tube, leads to biaxial orientation of the PVC material that is sufficient.

Further biaxial orientation can be imparted to this blown PVC film, as it is called, in a separate operation involving further stretchng of the PVC material. Such additional stretching is not however essential to ensure the increased deep-drawability of the container.

Synthetic resin adhesives, e.g. based on polyurethane, can be advantageously used for bonding the plastics film to the metal layer. The metal layer can be coated, on that of its surfaces that is on the outside of the container, with a protective varnish, having, for example, an epoxy base and optionally containing dyes. The plastics film itself may be coated on that of its surfaces presented to the interior of the container with a thermoplastic heat-sealing layer, the softening temperature of which is lower than that of the plastics material of the film. This layer can be used for sealing lids on to the containers. The heat-sealing layer may be applied to the plastics film as a varnish or a dispersion, or in the melted condition. It may also be applied to the inside surface of the lid.

If the plastics flim used is made of PVC or of a copolymer of vinyl chloride, it can be readily sealed to the lid without the use of an additional heat-sealing layer applied to the plastics film, and in this connection PVC films that have not been additionally stretched behave in a more advantageous manner since they exhibit only a slight tendency to shrink during the heat sealing. It is however also possible likewise to provide the inside surface of the container lide with a biaxially oriented PVC film so ast to seal the latter on to the PVC film provided on the inner surface of the container.

Printed matter can be provided on the outer surface of the container irrespective of whether or not the aluminium strip is coated with a protective varnish on its surface disposed on the outside of the container.

For the purpose of further explaining the invention, a particularly advantageous embodiment will now be described by way of example with reference to the attached drawing, in which:

Figure 1 is an axial section of a pot-like container embodying the invention, and

Figure 2 illustrates, on a larger scale, the laminar composition of the wall of the container of Figure 1.

Referring to the drawings, the pot-shaped container is made from a composite material comprising an aluminium layer 3 lined with a thinner plastics film 2 on its surface presented to the interior of the container. Applied to this plastics film, e.g. by painting, is a thin heat-sealing layer 1, the softening temperature of which is lower than that of the plastics material forming the film 2 and which serves for sealing a lid on to the counter. The aluminium layer on the outer surface of the container. The aluminium layer on the outer surface of the container has an outer coating of varnish 4.

If the plastics layer is PVC or a copolymer of vinyl chloride, the heat-sealing layer 1 can be dispensed with.

WHAT WE CLAIM IS:-

1. A drawn container made from a metal/plastics composite material, composed of a metal layer lined with a plastics film only on its surface presented to the interior of the container, the metal layer having a thickness in the range 0.04 to 0.30 mm,

and the plastics film being biaxially oriented and having a thickness in the range 0.008 to 0.025 mm.

2. A container according to claim 1, wherein the metal layer is made from 98 to 99.6% pure aluminium or from an aluminium alloy.

3. A container according to claim 2, wherein the aluminium layer has a thickness in the range 0.05 to 0.20 mm.

4. A container according to any of claims 1 to 3, wherein the plastics film is made from a polyethylene terephthalate (PETP), polyamide or polypropylene.

5. A container according to any one of claims 1 to 3, wherein the plastics film is made of PVC or of a copolymer of vinyl chloride.

6. A container according to claim 5, wherein the PVC or the copolymer of vinyl chloride forming the plastics film has a plasticizing additive.

7. A container according to claim 5, wherein the plastics film is made from a flexible PVC tube (known as blown PVC film) which has been inflated and then flattened whilst being stretched longitudinally.

8. A container according to any one of claims 1 to 7, wherein the plastics film has a thickness of 0.012 to 0.02 mm.

9. A container according to claim 8, wherein the plastics film has a thickness of 0.015 to 0.020 mm.

10. A container according to any one of claims 1 to 9, wherein the plastics film is bonded to the metal layer by means of a synthetic resin adhesive.

11. A container according to any one of claims 1 to 10, wherein the surface of the metal layer on the outside of the container is coated with a protective varnish.

12. A container according to claim 11, wherein the protective varnish contains dyes.

13. A container according to any one of claims 1 to 12, wherein the plastic film is provided on that of its surfaces presented to the interior of the container, with a thermoplastic heat-sealing layer, the softening temperature of which is lower than that of the plastics material forming the film.

14. A container according to claim 12, wherein the heat-sealing layer is applied as a varnish or a dispersion or in a melted condition.

15. A container according to any one of claims 1 to 13 which is sealed by means of a lid, the inner surface of the lid having a heat-sealing layer, by means of which the lid is directly sealed on to the plastics film on the inner surface of the container, the softening temperature of the heat-sealing layer being lower than that of the plastics material forming the film.

16. A container according to any one of claims 5 to 7 which is sealed by means of a lid, the inside of the lid being lined with a biaxially oriented PVC film, by means of which it is sealed to the PVC film located on the inner surface of the container.

17. A container substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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1523244 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.1

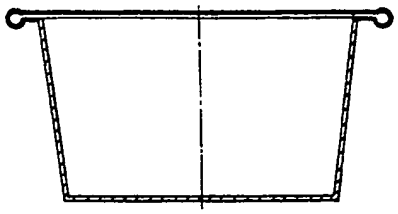
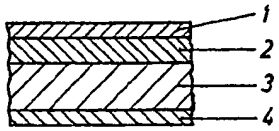


Fig.2



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